

REMARKS

Favorable reconsideration of this Application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-19 and 23-30 are pending in this application. Claims 1, 7, 12, 17-19, 26 and 29-30 are amended by the present amendment. Support for the new and amended claims can be found in the original specification, claims and drawings.¹ No new matter is presented.

In the Office Action, Claims 1-14, 16 and 18-30 were rejected under 35 U.S.C. §102(e) as anticipated by Greenstein et al. (U.S. Pat. 6,131,016, herein Greenstein); Claim 15 was rejected under 35 U.S.C. §103(a) as unpatentable over Greenstein in view of Takai et al. (U.S. Pat. 5,561,673, herein Takai); and Claim 17 was rejected under 35 U.S.C. §103(a) as unpatentable over Greenstein

The Official Action rejected Claims 1-14, 16 and 18-30 under 35 U.S.C. §102 as being unpatentable over Greenstein. In response to this rejection, Applicant respectfully submits that independent Claims 1, 7, 17-19 and 23-30 recite novel features clearly not taught or rendered obvious by the applied reference.

Applicant's amended Claim 1 recites, *inter alia*, a transmission diversity device, including:

...phase comparison and adjustment means for comparing phases of ***data signals*** received at the antenna elements and for adjusting phases of signals transmitted by the antenna elements according to the result of the comparison, wherein the transmission diversity device is designed for a multicarrier transmission and individually compares the phase of each ***data subcarrier*** of the multicarrier transmission of each antenna element with a phase of a corresponding ***data subcarrier*** of at least one other antenna element and adjusts it subsequently for a transmission.

¹ E.g., specification, at least at p. 5, ll. 20-22; p. 8, ll. 18-19; and the originally filed claims.

Independent Claims 7, 17-19 and 23-30, while directed to alternative embodiments, recite features similar to those noted above. Accordingly, the remarks and arguments presented below are applicable to each of independent Claims 1, 7, 17-19 and 23-30.

Turning to the applied reference, Greenstein describes a system for transmitting multi-carrier OFDM signals, including pilot tones. As shown in Fig. 2B, the downlink receiver, or terminal, performs differential phase detection of successive received pilot tones. The terminal receives the pilot tones, analyzes the pilot tones and transmits back to the base station a feedback signal comprising the results of the pilot tone analysis. This feedback signal is then used by the base station to adjust the data signals, that is the non-pilot tones within the tone cluster.²

Greenstein, therefore, fails to teach or suggest “comparing phases of *data signals* received at the antenna elements and for adjusting phases of signals transmitted by the antenna elements according to the result of the comparison,” as recited in amended independent Claim 1.

More specifically, Greenstein describes that pilot symbols are used to detect differences in signals received via different antennas. In contrast, the present invention does not use pilot symbols, but performs the phase comparison on each subcarrier of the received *data signals*.

As described in an exemplary embodiment at Fig. 5 and p. 5, ll. 26-36 of the specification, the received signals for each antenna are down converted etc., and a matrix with symbol vectors is formed and a phase comparison of each *data subcarrier* of all received symbol vectors occurs. The received signals could comprise any kind of data information, such as information content, control data, etc.. Thus, the present invention suggests a scheme in which no communication capacity is lost as compared to Greenstein, in

² Greenstein at col. 3, ll. 1-23.

which the part of the communication capacity is lost due to the requirement to transmit and receive pilot symbols.

More particularly, p. 5, ll. 20-22 and p. 8, ll. 18-19 of the specification explicitly states that a phase and/or amplitude adjustment is calculated in a transmitter side such that “no orthogonal signalling for each channel” is required. In other words, the transmission of orthogonal signalling data from two or more antennas is not necessary. It was common knowledge to one of ordinary skill in the art at the time of the invention that in an antenna diversity system, pilot symbols transmitted from different transmit antennas have to be orthogonal to each other in order to allow a receiver to distinguish which signals come from which antenna. Since, according to the present invention, each data subcarrier of a received symbol from each antenna is phase compared, the number of transmit antennas of the base station in the present invention is not limited because the data subcarriers are not required to be orthogonal.³

Thus, the claimed configuration of “comparing phases of *data signals* received at the antenna elements and for adjusting phases of signals transmitted by the antenna elements according to the result of the comparison,” allows for increased system flexibility (e.g., no limit on number of antennas) and improved efficiency (e.g., no need to transmit pilot symbols). In other words, the comparison is performed directly in the subcarriers of the data signals, and no pilot symbols or orthogonal symbols are necessary for the claimed phase adjustment.

As noted above, Greenstein’s system relies on the transmission, comparison and analysis of pilot symbols, which are clearly not that same as *data signals* since pilot symbols are not used to exchange data between the transmitter and receiver.

³ E.g., specification p. 8, ll. 19-22.

Greenstein, therefore, fails to teach or suggest “comparing phases of *data signals* received at the antenna elements and for adjusting phases of signals transmitted by the antenna elements according to the result of the comparison,” or that “the transmission diversity device is designed for a multicarrier transmission and individually compares the phase of each *data subcarrier* of the multicarrier transmission of each antenna element with a phase of a corresponding *data subcarrier* of at least one other antenna element and adjusts it subsequently for a transmission,” as recited in independent Claim 1.

As the pending independent claims recite substantially similar limitations to that discussed above, Applicant respectfully requests that the rejection of Claims 1-14, 16 and 18-30 under 35 U.S.C. §102 be withdrawn.

The Official Action rejected Claim 15 under 35 U.S.C. §103 as unpatentable over Greenstein in view of Takai. The Official Action contends that Greenstein describes all of the Applicant’s claimed elements with the exception of one antenna element not being used if a signal having an amplitude below a predetermined threshold is received from the antenna element. However, the Official Action cites Takai as describing this more detailed aspect of the Applicant’s claimed advancements, and states that it would have been obvious, to one of ordinary skill in the art at the time the invention was made, to combine the cited references to arrive at Applicant’s claims. Applicant respectfully traverses the rejection.

As noted above, Greenstein does not describe all of the features of the Applicant’s amended claims. Likewise, as Takai does not remedy these deficiencies alone or in combination with Greenstein, Applicant respectfully submits that a *prima facie* case of obviousness has not been presented.

Accordingly, Applicant respectfully requests that the rejection of Claim 15 under 35 U.S.C. §103 be withdrawn.

The Official Action has rejected Claim 17 under 35 U.S.C. §103 as being unpatentable over Greenstein. The Official Action contends that Greenstein discloses or suggests all of the Applicant's claimed features. Applicant respectfully traverses the rejection.

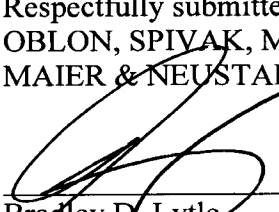
As noted above, Greenstein does not disclose all of the features of the Applicant's amended claims. Accordingly, Applicant respectfully submits that a *prima facie* case of obviousness has not been presented. Accordingly, Applicant respectfully requests that the rejection of Claim 17 under 35 U.S.C. §103 be withdrawn.

Consequently, in view of the foregoing amendment and remarks, it is respectfully submitted that the present Application, including Claims 1-19 and 23-30, is patently distinguished over the prior art, in condition for allowance, and such action is respectfully requested at an early date.

Respectfully submitted,
OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 03/06)
BDL/ATH/mms



Bradley D. Lytle
Attorney of Record
Registration No. 40,073

Andrew T. Harry
Registration No. 56,959